

CLAIMS

1. A waveguide (9, 18, 35, 38) for use in illuminating a display panel (2), comprising:
 - 5 a first face (13) arranged to receive light from a light source (3); and an exit face (15) through which light may exit the waveguide; configured so that, in use, light enters the waveguide (9, 18, 35, 38) through said first face, is scattered by a plurality of portions of diffusing material (10a to 10f, 19a to 19g) located within the waveguide (9, 18, 35, 38) and leaves the waveguide (9, 18, 35, 38) through said exit face (15).
- 10 2. A waveguide (9, 18, 35, 38) according to claim 1, wherein the light leaving the waveguide (9, 18, 35, 38) through the exit face forms a pattern of light lines.
- 15 3. A waveguide (18, 35, 38) according to claim 1 or 2, wherein at least one of said portions (19a to 19g) can be switched between a state in which said portion is predominantly light-transmissive and a state in which said part is predominantly diffusive.
- 20 4. A waveguide (18, 35, 38) according to claim 3, further comprising a plurality of electrodes (22, 23, 24, 24a, 39), wherein said at least one portion (19a to 19g) is configured to respond to the application of an electric field through said electrodes (22, 23, 24, 24a, 39) by switching from one of said light-transmissive state and said diffusive state to the other of said light-transmissive state and said diffusive state.
- 25 5. A waveguide according to claim 3 or 4, wherein light passing through a first region of the exit face (15) produces uniform illumination within a first area (26), while light passing through a second region of the exit face (15) produces a pattern of light lines within a second area (27).

6. A waveguide according to claim 5 when appended to claim 4, wherein said plurality of electrodes comprises a set of column electrodes (22, 23).

7. A waveguide according to claim 6, wherein said plurality of electrodes
5 further comprises a set of row electrodes (24).

8. A waveguide according to claim 5 when appended to claim 4, wherein said plurality of electrodes comprises a two dimensional array of electrodes (22a to 22c, 22p, 22q, 23a to 23d, 23p to 23s).

10 9. A waveguide according to claim 8, further comprising an active matrix (32, 33, 34).

15 10. A waveguide (35) according to any one of the preceding claims, comprising a reflective surface (36), wherein said reflective surface (36) is arranged to reflect light scattered by at least one portion (10a to 10f, 19a to 19g) in a direction leading away from the exit face (15).

20 11. A waveguide (9, 18, 35, 38) according to any one of the preceding claims, wherein the diffusing material comprises a liquid crystal.

12. A waveguide (18, 35, 38) according to claim 11, wherein the diffusing material is a liquid crystal gel.

25 13. A display (8, 17, 37) comprising:
a display panel (2); and
an illumination system arranged to illuminate the display panel (2), comprising a light source (3) and a waveguide (9, 18, 35, 38) according to any one of the preceding claims.

30 14. A display (8, 17, 37) according to claim 13, wherein at least one of said portions (19a to 19g) can be switched between a state in which said part is

predominantly light-transmissive and a state in which said part is predominantly diffusive so that light leaving the exit face (15) forms a pattern of light lines, comprising:

an arrangement (40, 41) for determining the position of a viewer (6);

5 means (25, 40) for switching one or more of the portions (19) in order to vary the position of the light lines according to the detected position of the viewer (6); and

means (35, 37) for adjusting an image displayed on the display panel (2) according to the detected position of the viewer.

10

15. A communications device comprising a display (8, 17, 37) according to claim 13 or 14.

15

16. A computing device (28) comprising a display (8, 17, 37) according to claim 13 or 14.

17. Audio/visual equipment comprising a display (8, 17, 37) according to claim 13 or 14.

20

18. A method of presenting an image comprising:

displaying an image on a display panel (2); and

providing backlighting for the display panel (2) using a light source (3) and a waveguide (18, 35, 38);

wherein said waveguide (18, 35, 38) comprises a layer (19) of diffusive

25

material and the step of providing backlighting comprises setting the optical properties of at least one portion (19a to 19g) of the layer (19) of diffusive material.

30

19. A method according to claim 18, wherein the step of setting optical properties comprises applying a potential difference across said at least one portion (19a to 19g).

20. A method according to claim 19, wherein the step of setting optical properties comprises switching at least one portion (19a to 19g) of the layer (19) of diffusive material between a state in which said portion (19a to 19g) is predominantly light-transmissive and a state in which said portion (19a to 19g)
5 is predominantly diffusive.

21. A method according to claim 18, 19 or 20, wherein the optical properties of said portions (19a to 19g) are set so that said backlighting comprises a plurality of light lines and said image is a 3D image (31).

10 22. A method according to claim 18, 19 or 20, wherein the optical properties of said portions (19a to 19g) are set so that uniform illumination is produced and said image is a 2D image (30).

15 23. A method according to claim 18, 19 or 20, comprising switching said regions (19a to 19g) between a first mode, in which a plurality of light lines is produced for illuminating a 3D image (31), and a second mode in which uniform illumination is produced for illuminating a 2D image (30).

20 24. A method according to claim 21 or 23, wherein said backlighting illuminates a first area of the display panel (2) with uniform illumination and a second area of the display panel (2) with the plurality of light lines, the image being displayed on the display panel (2) comprising a 2D image (30) within said first area and a 3D image (31) within said second area.

25 25. A method according to any one of claim 21, 23 or 24, comprising determining a position of a viewer (6) and adjusting said pattern of light lines and said image (31) according to the determined viewer position.